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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,683	11/20/1998	SEIJI MIZUNO	2013/14	9431

7590

06/21/2002

KENYON & KENYON
1500 K Street, N. W.
Suite 700
Washington, DC 20005

EXAMINER

CREPEAU, JONATHAN

ART UNIT

PAPER NUMBER

1745

10

DATE MAILED: 06/21/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF=19

Office Action Summary

Application No.

09/196,683

Applicant(s)

MIZUNO, SEIJI

Examiner

Jonathan S. Crepeau

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 April 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1 and 4-19. New grounds of rejection have been applied to all the claims under 35 USC §103. Accordingly, this action is non-final.

Claim Rejections - 35 USC § 103

2. Claims 8-16, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 7-249417 in view of Chow et al (U.S. Patent 5,284,718), in view of Pereira et al (U.S. Patent 6,044,842).

Regarding claims 8, 13, 18, and 19, in the abstract and Figure 1, JP 7-249417 discloses a fuel cell comprising a polymer electrolyte membrane (30) which is bonded to support frames (100) with a layer of adhesive (410). Regarding claims 10 and 14, the support frames function as separators and are arranged across gas diffusion electrodes (40) (see Figs 1, 3). Regarding claims 12 and 16, spherical spacer beads (60) made of polystyrene are mixed with the adhesive 410 (see paragraph [0024] of the machine translation). Regarding claims 11 and 15, the adhesive (410) may comprise a material from a "silicon system" or an "epoxy system" (see paragraph [0026]).

JP 7-249417 does not expressly teach that the adhesive has a durometer A hardness of not greater than 90 (claims 9, 13, 19), or a modulus of elasticity of not greater than 10 MPa (claims 8, 18) after cure. The reference also not expressly teach that the adhesive 410 may be a mixture of epoxy resin and modified silicone (claims 11, 15).

In column 2, line 63 et seq., Chow et al. teach that the use of sealing material between a polymer electrolyte membrane and an electrically conductive plate is known, and that the sealant material deteriorates because it is “not sufficiently resilient to withstand compressive forces over time.”

In column 3, lines 1, 2, and 44-59, Pereira et al. disclose an adapter member (20) comprising a “resilient, thermoplastic elastomer” (e.g., silicone) having a durometer A hardness of approximately 50-80, preferably 50-70. Furthermore, the reference teaches that durometer hardness measurements “generally correlate to the elastic modulus or resiliency of rubber compounds under conditions of relatively small strain.”

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Chow et al. to make the seals of the Japanese reference as resilient (elastic) as possible, in hopes of reducing the deterioration of the seals over time. Furthermore, according to the disclosure of Pereira et al., the resiliency, modulus of elasticity, and durometer hardness of a material are generally interrelated quantities (i.e., the durometer hardness and modulus of elasticity are proportional, and both are inversely proportional to the resiliency). As noted above, Chow et al. provides motivation to increase the resiliency of the seals of the Japanese reference, thereby providing motivation to use a material having a low durometer A hardness (i.e., less than 90) and low modulus of elasticity (i.e., less than 10 MPa). As also noted above, Pereira et al. teach a “resilient” material which has a durometer A hardness of 50-80. Accordingly, in view of the teachings of Chow et al. and Pereira et al., the claimed ranges of

durometer hardness and elastic modulus in the adhesives 410 of the Japanese reference would be rendered obvious to a skilled artisan.

Regarding claims 11 and 15, which recite that the adhesive is a mixture of epoxy resin and modified silicone, as also noted above, the Japanese reference teaches adhesives of a "silicon system" or "epoxy system" in paragraph [0026]. This disclosure alone is believed to fairly suggest a mixture of the two adhesives, since it has been held that it is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose. *In re Kerkhoven*, 205 USPQ 1069 (CCPA 1980). It is further noted that paragraph [0026] of the translation further discloses with regard to the seal 410 that "silicone RTV rubber or urethane RTV rubber which are mentioned later and which are used as elastic adhesives 420 do not interfere, either." The artisan may reasonably interpret this disclosure as indicating that adhesives used in seal 420 (between the plate 200 and the frame 100) are also suitable for use in seal 410. Paragraph [0034] discloses adhesives for use as seal 420, including "denaturation silicon [added] to the epoxy resin." Accordingly, the claimed mixture of epoxy resin and modified silicone is further believed to be rendered obvious in view of this disclosure.

3. Claims 1, 4-7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 7-249417 in view of Chow et al. in view of Pereira et al. as applied to claims 8-16, 18, and 19 above, and further in view of Palmer (U.S. Patent 4,804,451).

The Japanese reference does not expressly teach that the polymer electrolyte has a molar water fraction of less than 4.

The patent of Palmer is generally directed to electrodialysis and electrodeionization apparatuses using ion exchange membranes. In column 1, lines 47-61, the reference teaches that in devices in which membranes are bonded to frames with an adhesive, the bonds are weak because the membrane surfaces are wet.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the Palmer reference exemplifies that the practice of reducing the water content of ion-exchange membranes prior to bonding is well known in the art. The artisan would thereby be motivated to reduce the water content of the membrane of the Japanese reference prior to bonding in hopes of improving the sealability of the membrane with the separators. Accordingly, the recitation of a molar water fraction of less than 4 is not considered to patentably distinguish over the references.

Response to Arguments

4. Applicant's arguments filed April 1, 2002 have been fully considered insofar as they apply to the above rejections, but they are not persuasive. Applicants assert that the Palmer reference is non-analogous art because it is directed to a deionization apparatus used to purify a liquid, and that one of ordinary skill in the art would not have looked to Palmer's purification apparatus for "solutions to the thermal and chemical environment concerns solved by the present invention." Pursuant to MPEP §2141.01(a), in order to rely on a reference as a basis for

rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). It is respectfully submitted that the problem faced by Applicants was improving the sealing between an ion-exchange membrane and a support frame. Accordingly, the Palmer reference is believed to be analogous art, as it is also concerned with improving the sealing between an ion-exchange membrane and a support frame.

Applicants further assert that Palmer "teaches away" from the present invention because Palmer suggests adhering an intermediate layer between the membrane and the frame in column 1, line 62 et seq. In response, the Examiner submits that Palmer does not "teach away" from the claimed invention because such an intermediate layer is not excluded by the claims. Furthermore, the nature of the alleged "intermediate layer" as defined by Applicants is unclear, as it appears to be simply an adhesive layer for bonding the membrane to the frame.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (703) 308-2383. The phone number for the

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organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


STEVEN P. GRIFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

JSC

June 13, 2002